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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PARSONS, THOMAS H	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 10/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/623,991	FORMANSKI ET AL.	
	Examiner	Art Unit	
	Thomas H. Parsons	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,8-12,14 and 16-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,12-14 and 16-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Amendment

This is in response to the Amendment filed 8 September 2006.

(*Previous*) DETAILED ACTION

Specification

1. The objection to the disclosure because of minor informalities has been withdrawn in view of Applicant's Amendment.

Claim Rejections - 35 USC § 103

2. The rejections of claims 1, 3-6, 8-12, 14 and 16-22 under 35 U.S.C. 103(a) as being unpatentable over Benz et al. (5,645,950) in view of Reiser et al. (4,202,933) have been withdrawn.

Response to Arguments

3. Applicant's arguments with respect to claims 1, 3-6, 8-12, 14 and 16-22 have been considered but are moot in view of the new ground(s) of rejection.

(*New*) DETAILED ACTION

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 8-12, 14, 16-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not enable one skilled in the art to which it pertains to control a quantity or flow of feedback gas from the cathode side to effect a relative humidity of the cathode supply gas, or to adjust the controlled quantity of cathode feedback gas based on a desired relative humidity of the cathode supply gas.

The specification discloses in Figures 4 and 5 fuel cell system characteristics based on relative humidity increased attributed to a feedback gas flow. The key characteristics include feedback gas mass flow, total compressor mass flow, compressor discharge temperature, and dew point temperature. However, these figures provide no guidance on specific values or range of values needed to control a quantity of feedback gas from the cathode side to affect a relative humidity of the cathode supply gas. Further, in order to adjust a controlled quantity of cathode feedback gas based on a desired relative humidity of the cathode supply gas, would not the method or system require a means of measuring or determining the relative humidity and providing a signal back to the controller so to adjust the metering device, the compressor or the injector.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3-6, 8-12, 14 and 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benz et al. (5,645,950) in view of Kaufmann (2003/0219636).

Claim 1: Benz et al. in Figure 1 disclose a fluid flow system to adjust a humidity of a gas supplied in a fuel cell system, comprising:

a fuel cell stack (12) having a cathode inlet and a cathode exhaust (col. 2: 8-12);

a compressor (6) that draws in fresh gas (3) and compresses the gas therein; and

an injector (10) injecting water into the gas within the compressor, the compressor supplying the gas to the cathode inlet; and

a controller that controls the compressor and the injector to adjust the humidity (col. 3: 60-col. 4: 12). See col. 2: 8 - col. 3: 15, and col. 3: 48 - col. 4: 54.

Benz et al. do not disclose a compressor that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein, a metering device to adjust the flow of cathode exhaust to the compressor, and a controller that controls the metering device.

Kaufmann in Figures 1, 3 and 4 discloses a compressor (5) that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein, a metering device (i.e. controllable throttle 7 or controllable valve 10) to adjust the flow of cathode exhaust to the compressor, and a controller that controls the metering device (paragraphs [0006]-[0012], [0018]-[0023], and [0031]-[0038]).

The Examiner has construed the controllable throttle 7 or controllable valve 10 as a metering device in light of the Kaufmann's teaching in paragraph [0012], [0020], and [0032] which disclose that these devices make it possible to influence (i.e. measure) the quantity or ratio

of oxidant stream flowing through return line 6 and to set the degree of humidification affected by the recirculation of oxidant. The Examiner has also construed Kaufman's teaching of a controllable throttle or valve as encompassing a controller for controlling such devices.

Further, Reiser et al.'s teaching of a controller 11 for controlling the entire fuel cell system as well as compressor 6, injector 10 in combination with Kaufmann's teaching of a controllable throttle or valve would obvious a controller that controls the metering device, the injector, and the compressor to adjust humidity.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the system of Benz et al. by incorporating the cathode exhaust return line and controllable throttle or valve of Kaufmann because both are concerned with adjusting the humidity of a gas supplied to a fuel cell system, and further Kaufmann teach a compressor that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein, and a controllable a metering device that would have provided a simplified means for achieving a water balance in the overall fuel cell system, and for humidifying the fuel cell membrane thereby improving fuel cell performance and provide cost savings.

Claims 3-6: The limitations set forth therein have been considered, and construed as process limitations that add no additional structure to the Benz et al, combination. Further, because the Benz et al. combination is structurally the same as instantly claimed, and provides a controller in communication with the compressor, the injector, and metering device, it appears capable of providing the claimed process limitations.

Claim 8: The rejection of claim 8 is as set forth above in claim 1 wherein the Benz et al. combination would obviously provide a method of regulating a humidity of a cathode supply gas to a cathode side of a fuel cell stack, comprising:

mixing the cathode supply gas with a feedback gas from the cathode side to affect a relative humidity of the cathode supply gas;

injecting water into the cathode supply gas to further effect the relative humidity of the cathode supply gas; and

compressing the cathode supply gas in a compressor. See col. 2: 8 - col. 3: 15, and col. 3: 48 - col. 4: 54.

In particular, Benz et al. in Figure 1 disclose a method of regulating a humidity of a cathode supply gas to a cathode side of a fuel cell stack, comprising:

injecting water into the cathode supply gas to effect the relative humidity of the cathode supply gas; and

compressing the cathode supply gas in a compressor. See col. 2: 8 - col. 3: 15, and col. 3: 48 - col. 4: 54.

Benz et al. do not disclose mixing the cathode supply gas with a controlled quantity of feedback gas from the cathode side to affect a relative humidity of the cathode supply gas, the controlled quantity of cathode feedback gas adjusted based on a desired relative humidity of cathode supply gas.

Kaufmann in Figures 1 and 3-4 discloses mixing the cathode supply gas with a controlled quantity of feedback gas (via a controllable throttle or controllable valve) from the cathode side to effect a relative humidity of the cathode supply gas, the controlled quantity of cathode

feedback gas adjusted based on a desired (degree) relative humidity of cathode supply gas (paragraphs [0006]-[0012], [0018]-[0023], and [0031]-[0038]).

Kaufmann, in paragraph [0012], [0020], and [0032], disclose that the controllable throttle or controllable valve make it possible to influence (i.e. measure) the quantity or ratio of oxidant stream flowing through return line 6 and to set the degree (desired) of humidification affected by the recirculation of oxidant. *The Examiner has construed humidity as broadly encompassing relative humidity.*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the system of Benz et al. by incorporating the cathode exhaust return line and controllable throttle or valve of Kaufmann because both are concerned with adjusting the humidity of a gas supplied to a fuel cell system, and further Kaufmann teach a compressor that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein, and a controllable a metering device that would have provided a simplified means for achieving a water balance in the overall fuel cell system, and for humidifying the fuel cell membrane thereby improving fuel cell performance and provide cost savings.

Claim 9: The rejection is as set forth above in claim 8 wherein further the Benz et al. combination discloses that the cathode supply gas is air. See Benz et al., Figure 1, air supply line 3. Kaufmann in the abstract also disclose that the cathode supply gas is air.

Claim 10: The rejection is as set forth above in claim 8 wherein further Benz et al. disclose vaporizing the water within the compressor (col. 3: 4-6). Kaufmann in paragraph [0011] also discloses vaporizing the water within the compressor.

Claim 11: The rejection is as set forth above in claim 8 wherein further Benz et al. disclose that vaporizing is achieved using heat generated through compression (col. 3: 4-6). Kaufmann in paragraph [0011] also discloses that vaporizing is achieved using heat generated through compression.

Claim 12: The rejection is as set forth above in claim 8 wherein further Benz et al. disclose adjusting a compression pressure of the compressor based on a quantity of water to vaporize the water therein (col. 3: 63- col. 4: 30).

Claim 14: The rejection of claim 14 is as set forth above in claim 1 wherein the Benz et al. combination would obviously provide a method of regulating a relative humidity of a gas supplied to a cathode side of a fuel cell stack, comprising:

controlling a flow of feedback gas from the cathode side to a compressor to adjust the relative humidity of the gas (see claim 13 above);

vaporizing water in the compressor to further adjust the relative humidity of the gas (Benz et al. disclose vaporizing the water within the compressor (col. 3: 4-6).;

and discharging the gas at a pressure sufficient for use in the fuel cell stack. See col. 2: 8 - col. 3: 15, and col. 3: 48 - col. 4: 54.

Benz et al. disclose that the water may be injected upstream of the compressor which has been construed as providing water injection into the compressor.

In particular, Benz et al. in Figure 1 disclose a method of regulating a humidity of a cathode supply gas to a cathode side of a fuel cell stack, comprising:

directing a flow of cathode supply gas (3) to a compressor (6);

injecting water (via injection nozzle 10) into the compressor, controlling the water injection (via controller 11) to adjust relative humidity;

vaporizing water in the compressor to adjust relative humidity; and,

discharging the gas at a pressure sufficient for use in the fuel cell stack. See col. 2: 8 - col. 3: 15, and col. 3: 48 - col. 4: 54.

Benz et al. do not disclose controlling a flow of feedback gas from the cathode side to a compressor to adjust relative humidity.

Kaufmann in Figures 1, and 3-4 disclose controlling a flow of feedback gas from the cathode side to a compressor (via controllable throttle or controllable valve) to adjust relative humidity wherein the gas is discharged at a pressure (p_1) sufficient for use in the fuel cell stack (paragraphs [0006]-[0012], [0018]-[0023], and [0031]-[0038]).

The Examiner has construed humidity as broadly encompassing relative humidity.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the system of Benz et al. by incorporating cathode exhaust return line and controllable throttle or valve of Kaufmann because both are concerned with adjusting the humidity of a gas supplied to a fuel cell system, and further Kaufmann teach a compressor that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein, and a controllable a metering device that would have provided a simplified means for achieving a water balance in the overall fuel cell system, and for humidifying the fuel cell membrane thereby improving fuel cell performance and provide cost savings.

Claim 16: The rejection is as set forth above in claim 8 wherein further Benz et al. disclose that vaporizing is achieved using heat generated through compression (col. 3: 4-6). Kaufmann in paragraph [0011] also discloses that vaporizing is achieved using heat generated through compression.

Claim 17: The rejection is as set forth above in claim 8 wherein further Benz et al. disclose adjusting a compression pressure of the compressor based on a quantity of water to vaporize the water therein (col. 3: 63- col. 4: 30).

Claims 18 and 19: The rejection is as set forth above in claim 8 wherein the Benz et al. combination discloses a feedback gas but is silent as to a saturated or super-saturated feedback (i.e. recycled cathode exhaust gas). However, because the method of the Benz et al. combination is the same as that instantly claimed, it would obviously provide a saturated or super-saturated feedback.

Claim 20: The rejection is as set forth above in claim 1 wherein the Benz et al. combination would obviously provide a method of regulating a relative humidity of a gas, comprising:

controlling a flow of feedback gas to a compressor to adjust said relative humidity of said gas (see claim 13 above); and

vaporizing water injected into the compressor to further adjust the relative humidity of the gas Benz et al. disclose vaporizing the water within the compressor (col. 3: 4-6).

In particular, Bens et al. disclose a method of regulating a relative humidity of a cathode supply gas to a cathode side of a fuel cell stack, comprising:

directing a flow of cathode supply gas (3) to a compressor (6);

injecting water (via injection nozzle 10) into the compressor, controlling the water injection (via controller 11) to adjust relative humidity;

vaporizing water in the compressor to adjust relative humidity See col. 2: 8 - col. 3: 15, and col. 3: 48 - col. 4: 54.

Benz et al. do not disclose Benz et al. do not disclose controlling a flow of feedback gas from the cathode side to a compressor to adjust relative humidity.

Kaufmann in Figures 1, and 3-4 disclose controlling a flow of feedback gas from the cathode side to a compressor (via controllable throttle or controllable valve) to adjust relative humidity wherein the gas is discharged at a pressure (p_1) sufficient for use in the fuel cell stack (paragraphs [0006]-[0012], [0018]-[0023], and [0031]-[0038]).

The Examiner has construed humidity as broadly encompassing relative humidity.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the system of Benz et al. by incorporating cathode exhaust return line and controllable throttle or valve of Kaufmann because both are concerned with adjusting the humidity of a gas supplied to a fuel cell system, and further Kaufmann teach a compressor that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein, and a controllable a metering device that would have provided a simplified means for achieving a water balance in the overall fuel cell system, and for humidifying the fuel cell membrane thereby improving fuel cell performance and provide cost savings.

Claims 21 and 22: The rejection of claims 21 and 22 are as set forth above in claims 18 and 19.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas H. Parsons whose telephone number is (571) 272-1290. The examiner can normally be reached on M-F (7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thomas H Parsons
Examiner
Art Unit 1745

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER

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